ecom®

Creative Technology made by rbr

# Operating Instructions

# ecom® B

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## Important Remark

**The ecom-B meets the requirements of the DIN EN 50379 Part 2.**

**The ecom-B may not be used for continuous emission control!**

**Following minimum times must be kept to get correct measurement results:**

- **-1 Minute for fresh air calibration**
- **-2 Minutes to get stable measurement results**

**Following substances affect the function of the instrument:**

- **-solvent containing gases as in:**
  - **- cleaning agents**
  - **- fat remove agents**
  - **- wax polish**
  - **- adhesives**
- **-Formaldehyde**

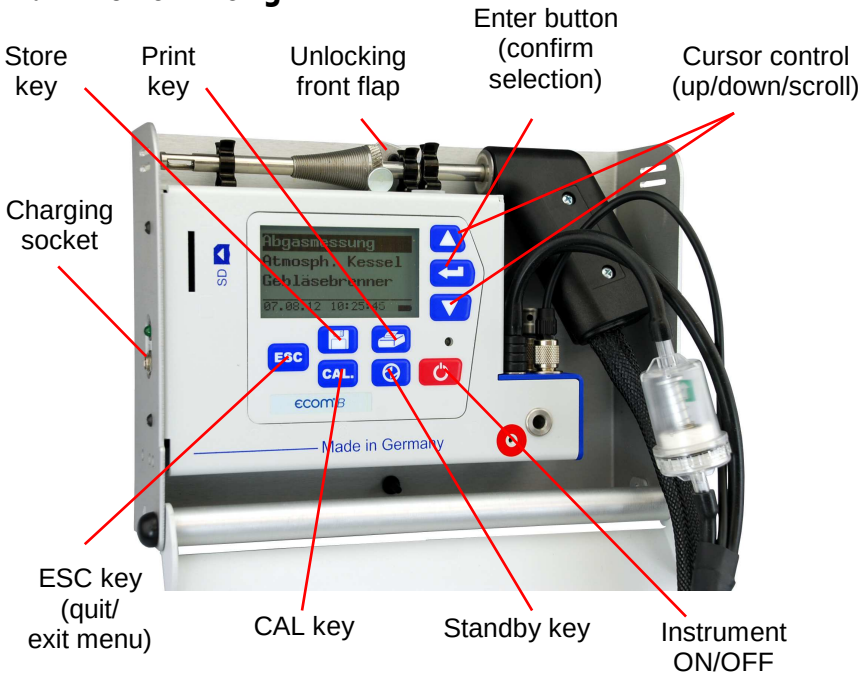
**Settings on fireplaces should just be made by professionals who are experienced with the function and adjustments of fireplaces!**

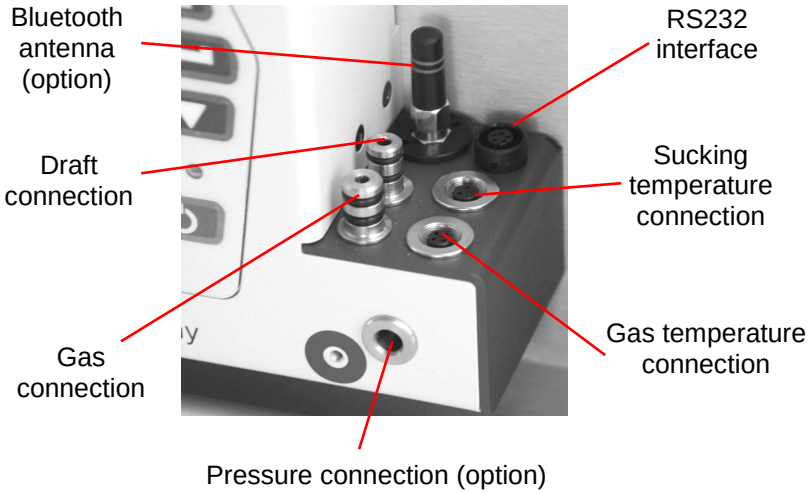
1. **Charge the accumulator regularly (Charge not used instrument min. once a month)!**
2. **Never store the instrument with unloaded accumulator!**

**Fresh air opening**

**Do not lock fresh air opening for fresh air pump!**

# 1. Instrument Design

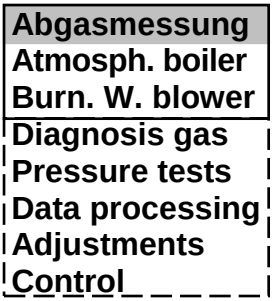


## 2. Accessoires ecom-ß

| | |
|---|---|
| **Soot pump kit**<br>Item no.:<br>50538<br> | **T-Room sensor stick**<br>Item no.:<br>102888<br> |
| **External printer**<br>Item no.:<br>3140300<br> | **Data cable CN**<br>Item no.:<br>31000043<br>*without illustration* |
| **Adaptor cable USB / RS 232**<br>Item no.:<br>51521<br>*without illustration* | |

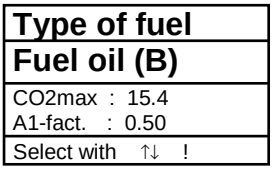
## 3. Switch on Instrument




After switch on the instrument (press **<I/0>**) the main menu appears on the display. There will be displayed sub-menus with following functions (not visible sub-menus could be displayed by scrolling with arrow keys):

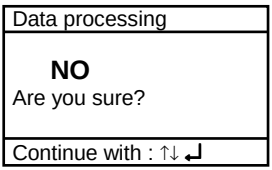
Comb. measurement : operate combustion measurement
(Atmospheric boiler : operate routine for atmospheric boilers)*
(Fan burner : operate routine for fan burners)*
(Diagnostic gas : operate routine for gas fireplaces)*
(Pressure tests : pressure tests according to TRGI)*
(Data processing : assign measurements / Data transfer)*
Adjustments : change adjustments of instrument
Control : check operating status of instrument (* = Option)

To perform measurements, select with the cursor keys the sub-menu **"Gas analysis"** and confirm with **<Enter>**. The instruments starts then a 1- minute calibration phase and the fuel types selection list is displayed. The following fuel types are available:



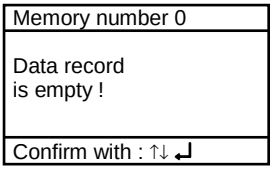

Fuely types acc. to 1st BImSchV
Fuel oil (B)
Natural gas (B)
City gas (B)
Coke oven gas (B)
Liquid gas (B)

Use the cursor keys to select the desired fuel type and confirm with **<Enter>**. The instrument will then enquire if you wish to use the data bank (only with option „Data processing“).If you want to assign the sampled data to a specific plant, so choose **„YES“** with the cursor keys and confirm with **<Enter>**. (**„NO“** = measurement will be performed without assignment).



## 4. Input or select a data record (Option)

The ecom CL has 300 storage locations (option). In order to call up a data record whith data are already stored in the instrument or to create a new file, choose a data record with the Cursor keys and confirm with **<Enter>**




If you are choosing an empty data record, a designation (max. 16 indications) can be assigned. Proceed as follows:

-choose a keyboard with the **<CAL.>** key (5 keyboards are available)
-select a caracter with the keys **<Store>** (left), **<Print>** (right) and the Cursor keys **<up/down>** (selected caracter is black deposits)
-take over the caracter with **<Enter>**
-repeat procedure, until desired designation is complete
-if you want to correct a caracter, proceed as follows:
  -interrupt the selection with **<Standby>**
  -select the caracter with the keys **<Store>** (left), **<Print>** (right) and the Cursor keys **<up/down>**
  -activate the selektion with **<Standby>** and select the correct caracter

-turn to Combustion measurement with 2 x **<ESC>** , **„Comb. measurem.“** and **<Enter>**.

If you are choosing a data record with data, you can call up the data with **<Enter> / <Store> / <Enter>**. Now you can view the data with the Cursor keys **<up/down>**.

# 5. Combustion Measurement

## 5.1 Prepare Combustion Measurement

Condensate pad

Prepare instrument for measurement operation by making all connections (T-Room sensor and T-Gas, GAS and DRA of the 3-chamber hose). Make sure that:

-the condensate pad has sufficient capacity
-the condensate pad is not soiled darker than no. 3 on the soot scale

## 5.2. Gas Analysis

**Just position the probe in the exhaust pipe once the calibration phase is over!**

**To obtain accurate measurement values it's important to re-calibrate the instrument after each measurement (at the latest after one hour)!**

Once the calibration cycle is over, the instrument enters the measurement mode. The measurement values could be displayed on 4 screen pages (3 x gas analysis; 1 x draught measurement – change with curser keys):

| | | |
|---|---|---|
| O2 | **4.0** | % |
| CO2 | **12.5** | % |
| T.Air | **20** | ℃ |
| T.Gas | **212** | ℃ |

| | | |
|---|---|---|
| O2 | **4.0** | % |
| CO2 | **12.5** | % |
| CO | **30** | ppm |
| Lambda | **1.23** | |

| | | |
|---|---|---|
| O2 | 4.0 | % |
| CO2 | 12.5 | % |
| CO | 30 | ppm |
| Lambda | 1.23 | |
| T.Gas | 166 | ℃ |
| T.Air | 20 | ℃ |
| Losses | 7.0 | % |
| Eta | 93.0 | % |

The position of the measured and calculated values (gas analysis) can be choosen freely on the display. To change the position or the composition, please proceed as follows:

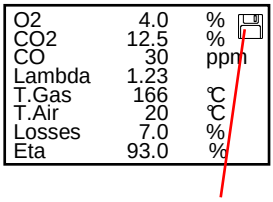
-with **<Enter> / <Display values> / <Enter>** activate the first line on the display
-choose with curser key the measured or calculated value
-with **<Enter>** activate the next line on the display and so on
-with **<ESC>** or **<Enter>** in the last line you leave this process.

The values for $CO_2$, Efficiency, Losses, Lambda and the Dew Point are calculated values. They just can be calculated when realistic figures for the basic values like $O_2$ and the temperature are available. It must be assured that:

**$O_2$ < 20,5 %** and **T.Gas – T.Air > + 5℃**

The dew point can just be calculated correctly if in the menu "Adjustments / Air pressure" the current barometric air pressure has been entered. If the combustion gas temperature falls below the dew point /between 25 and 65℃) the efficiency will be calculated with condensation gain. In this case a (C) is displayed behind the efficiency . Correct measurement values are displayed after a delay of 1 to 1,5 minutes necessary for the gas transport to the sensors and to establish a stable electrochemical reaction in the sensors. For storage and printing wait for the values to become stable. If the gas value still fluctuates for more than 2 ppm, the reason could be in an unstable draft condition in the gas channel.

Once the measurement values are stable and the results can be printed, press **<store>** (Disc symbol) to transfer the values to the temporary memory. Data will be stored here for later printout (the values of the temporary memory could be checked by pressing **<Enter>** / **<store>** / **<Enter>**. While checking the values the gas pump will be switched off in order to spare the sensors. (back with **<ESC>**).



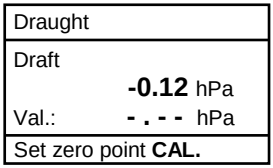

**Measurement stored in temporary memory**

The internal program protects the CO-sensor for overload. In case the limit of 4000 ppm is exceeded a second pump switches on and flows the sensor with fresh air. After sufficient flushing time (blinking: "CO"), the sensor can be brought back to the measurement mode with **<Enter> / <CO MV ON/OFF> / <Enter>** (the sensor can also manually be switched off by pressing **<Enter> / <CO MV ON/OFF> / <Enter>**).

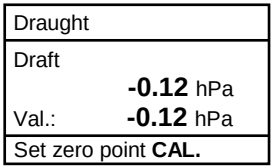
## 5.3. Draft Measurement

The gas measurement mode already provides a trend indication of the draught conditions in the combustion gas channel. As the pressure sensor is very sensitive and tend to drift, the value will not be recorded by pressing **<store>**. It is therefore recommended to recalibrate this sensor prior to the actual measurement and results printing.

The current value will be displayed as well as the remark to reset the zero point of the sensor. Therefore disconnect the draught hose from the instrument and press the key **<CAL>**. By this the sensor is calibrated.




Connect the draught hose again with the instrument. The exact measurement value is displayed now and can be stored by pressing **<store>** and added to the other values already in the temporary memory. The stored value will appear on the display.



## 5.4. Soot...Oil trace

Under **„Soot...Oil trace“** the measurement results for boiler temperature, soot number and oil derivative can be entered. Select the corresponding line in the display and activate the entry by **<Enter>**. The input for boiler temperature and soot number (3 measurements) can be done as follows:
-select with the keys **<store>** (left) and **<Print>** (right) the position which should be changed (corresponding field is blinking)
-enter the designated number with the curser keys **<up/down>**

By pressing the key **<Enter>** the entry will be transferred to the data record of the measurement. The result of the oil derivative checking will be documented as follows:

-set cursor to line **“Ölderivat”**
-select the result with the key **<Enter>** (**“No”**, **“Yes”** or **“- - -“**)

| Soot...Oil trace | |
|---|---|
| T.Boiler | --- ℃ |
| 1.Soot meas. | --- |
| 2.Soot meas. | --- |
| 3.Soot meas. | --- |
| Oil trace | --- |
| Input: ↵ | |

When all necessary entries have been made the entry can be closed by pressing the key **<ESC>**. The measurement is now completed.

## 5.5. Record and print Measurement

**After the gas analysis, please transfer the recorded data (intermediate memory) into the internal instrument memory otherwise the values will get lost by instrument switch-off!**

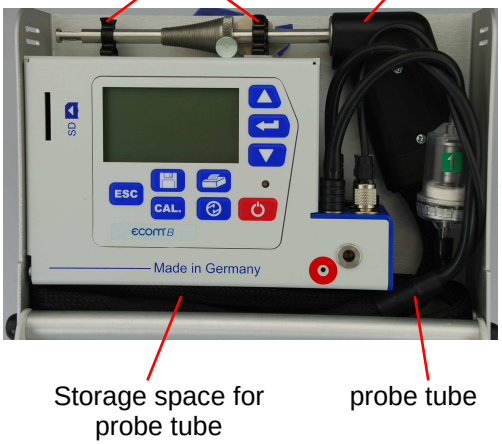
After scrolling back to the gas measurement with the cursor keys **<up/down>** the measurement can be transferred to the internal memory with **<Enter> / <Store to memory> / Enter>** (after successful storage an **“M”** will appear right down in the display). Finally a print-out (IR printer required) of the results can be made (key **<Print>**).

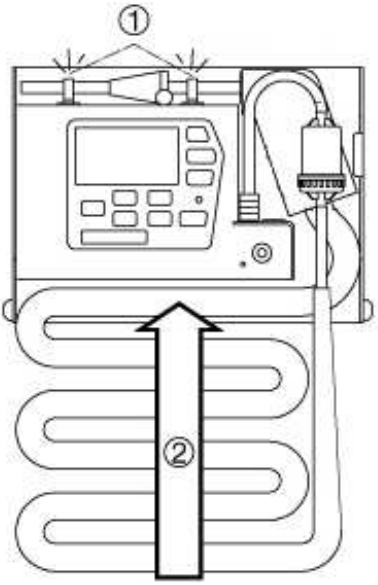
| Display/Memory |
|---|
| Memory<br>Store to memory<br>Display values<br>CO MV ON/OFF |
| Continue with: ↑↓↵ |

## 5.6. After Measurement

**Let the probe cool down before fixing it back in the fixation of the case!**

Stow probe and probe tube in the device as follows:
1. Attach the probe to the designated fixation.
2. Slide the probe tube starting at the probe into the space between device and case. Pass the hose here alternately from right to left and from left to right.



## 6. Measurement Routines (Option)

The ecom-B provides measurement routines which makes standard checking on atmospheric boilers and fan burners easier.

### 6.1. Atmospheric Boilers

Select from the main menu the sub menu **„Atmosph. Boilers"** and press **<Enter>.** The table of fuel types will be displayed. Following fuel types can be selected:

| **Type of fuel** |
|---|
| **Natural gas (B)** |
| CO2max : 11.8 |
| A1-fact. : 0.37 |
| Select with ↑↓ ! |

Natural gas (B)
Town gas (B)
Coke gas (B)
Liquid gas (B)

Select with the arrow keys the corresponding fuel type and confirm by pressing **<Enter>.** The measurement **"Draft / Pressure"** is displayed. To operate the measurement (0 – 100 hPa) the draught hose must be connected. In case of deviations of the zero point it could be reset by pressing **<CAL>**.

| Atmosph. boiler |
|---|
| Connection pressure<br>**24.7** hPa<br>Val.: **24.7** hPa |
| Set zero point **CAL.** |

Connect the draught hose to the instrument. After the pressure has stabilised it can be stored by pressing **<store>** for later printout. By pressing the key **<store>** again the value will be deleted. Using the cursor **<down>** it could be get to the next measurement.

| Atmosph. boiler |
|---|
| Flow pressure<br>**21.1** hPa<br>Val.: **21.1** hPa |
| Set zero point **CAL.** |

Operate the following pressure measurement as described above. Not needed measurements can be skipped by using the cursor key **<down>** (these will not be printed).

| Atmosph. boiler |
|---|
| Nozzle pres pa. load<br>**4.4** hPa<br>Val.: **4.4** hPa |
| Set zero point **CAL.** |

| Atmosph. boiler |
|---|
| Nozzle pres fu. load<br>**13.1** hPa<br>Val.: **13.1** hPa |
| Set zero point **CAL.** |

Another feature of the ecom-B is to determine the thermal capacity brought to the boiler. For this the gas meter has to be observed. By pressing **<Enter>** a stopwatch can be started and stopped. The amount of gas consumed in the meantime is necessary for calculation and is entered as follows:

1. Select the position which should be changed with the keys **<store>** (left) and **<Print>** (right) (corresponding field flashes)

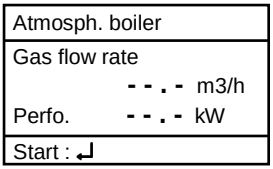
2. Set the value by using the cursers **<up / down>**.

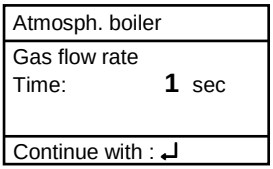
After setting and confirmation by pressing **<Enter>** the result of the calculation will be displayed and stored. Calculation can be repeated if needed. For calculation following heating values are taken:

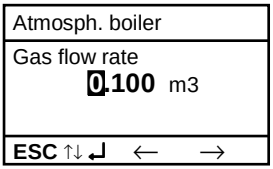
Natural gas (B) = 9,53 kWh/m3
Town gas (B) = 5,00 kWh/m3
Coke gas (B) = 4,83 kWh/m3
Liquid gas (B) = 25,90 kWh/m3

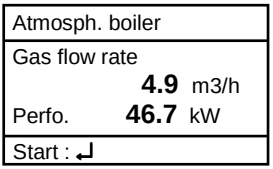
By using the curser **<down>** it can be scrolled to the next measurement **„Pressure free“**. Here is the option for another pressure measurement.

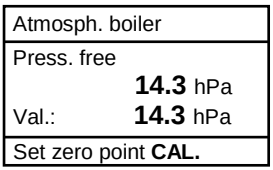
At the next point of the routine (Curser **<down>**) is the option of determination of a temperature difference (W. Temp. warm – W. Temp. cold).

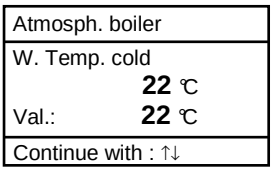


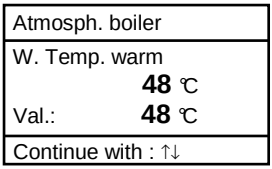
For determination of the two temperatures the T-Room probe is used (waterproof version).

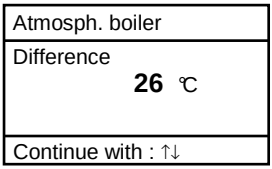
Storage of the measurement values (after getting stable) is done by the key **<store>**.

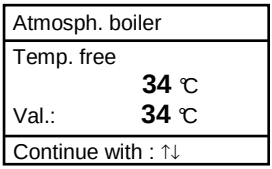
By using the curser **<down>** it can be scrolled to the next measurement **"Temp free"**. Here is the option for another temperature measurement.

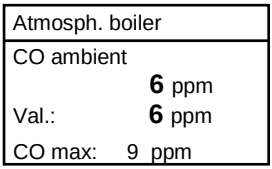
After storing the temperatures the CO-measurements are next. By pressing the curser **<down>** a 1-minute calibration cycle starts for flashing the sensors with fresh air. During calibration cycle the probe must not be positioned in the combustion tube. After calibration cycle the CO-content of the surrounding air can be determined. Use the probe to check the area around the boiler. Beside the stored value (press key **<store>**) the instrument stores the maximum CO-value of the measurement.

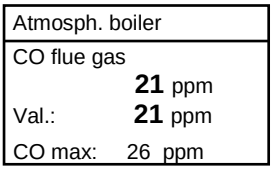
Next point of the routine (curser key **<down>**) is the CO-value in the combustion tube of the boiler which is determined. For measurement the probe must be positioned in the combustion tube. Apart from the stored value the maximum CO-value of the measurement is stored.



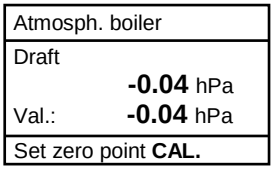



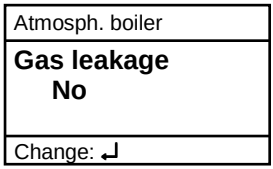



After storing the CO-values the next point are the draught measurements (curser key **<down>**). For exact measuring it's recommended to reset the sensor to zero. Remove the draught hose off the instrument and press **<CAL>**. The zero point of the sensor is set now. After the draught has stabilised it can be stored for later printout by pressing the key **<store>**:




At the end of the measurement routine (curser down) it is checked whether a gas leakage at the unit could be determined. Confirmation could be done by using the key **<Enter>** (yes / no).




The printout (IR printer required) of all results of the measurement routine could be done by pressing **<Print>**.

## 6.2. Fan burners

Select from the main menu the sub menu **"Fan burner"** and press **<Enter>**. The table of fuel types will be displayed. Following fuel types can be selected:

| **Type of fuel** |
|---|
| **Natural gas (B)** |
| CO2max : 11.8<br>A1-fact. : 0.37 |
| Select with ↑↓ ! |

Natural gas (B)
Town gas (B)
Coke gas (B)
Liquid gas (B)

Select with the arrow keys the corresponding fuel type and confirm by pressing **<Enter>**.

### 6.2.1. Gas fan burners

Selecting a gas fuel type the routine starts with the measurement **"Connecting pressure"**. To operate the measurement (0 – 100 hPa) the draught hose must be connected. In case of deviations of the zero point it could be reset by pressing **<CAL>**.

| Burn. w. blower |
|---|
| Connection pressure<br>**22.1** hPa<br>Val.: **22.1** hPa |
| Set zero point **CAL.** |

Connect the draught hose with the instrument. After the pressure has stabilised it can be stored by pressing **<store>** for later printout. By pressing the key **<store>** again the value will be deleted. Using the cursor **<down>** it could be get to the next measurement.

| Burn. w. blower |
|---|
| Flow pressure<br>**18.7** hPa<br>Val.: **18.7** hPa |
| Set zero point **CAL.** |

Operate the following pressure measurement as described above. Not needed measurements can be skipped by using the cursor key **<down>** (these will not be printed).

| Burn. w. blower |
|---|
| Nozzle pres pa. load<br>**6.4** hPa<br>Val.: **6.4** hPa |
| Set zero point **CAL.** |

| Burn. w. blower |
|---|
| Nozzle pres fu. load<br>**13.0** hPa<br>Val.: **13.0** hPa |
| Set zero point **CAL.** |

Another feature of the ecom-B is to determine the thermal capacity brought to the boiler. For this the gas meter has to be observed. By pressing **<Enter>** a stopwatch can be started and stopped. The amount of gas consumed in the meantime is necessary for calculation and is entered as follows:

1. Select the position which should be changed with the keys **<store>** (left) and **<Print>** (right) (corresponding field flashes)

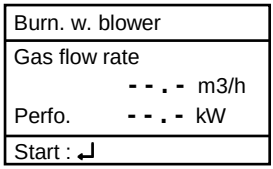
2. Set the value by using the cursers **<up / down>**.

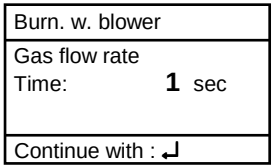
After setting and confirmation by pressing **<Enter>** the result of the calculation will be displayed and stored. Calculation can be repeated if needed. For calculation following heating values are taken:

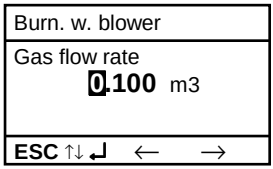
Natural gas (B) = 9,53 kWh/m3
Town gas (B) = 5,00 kWh/m3
Coke gas (B) = 4,83 kWh/m3
Liquid gas (B) = 25,90 kWh/m3

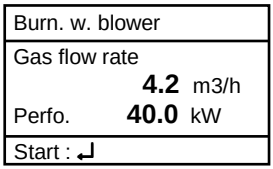
By using the curser **<down>** it can be scrolled to the next measurement **„Pressure free“**. Here is the option for another pressure measurement.

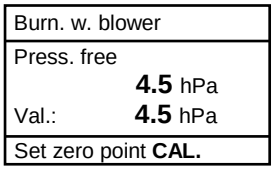
At the next point of the routine (Curser **<down>**) is the option of determination a temperature difference (W. Temp. warm – W. Temp. cold). For determination of the two temperatures, the T-Room probe is used (waterproof version).

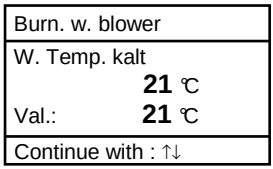


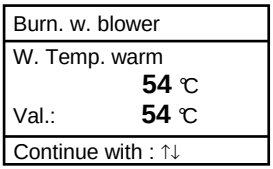



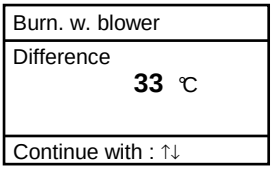



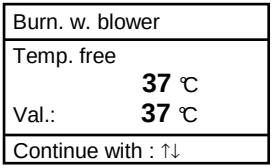



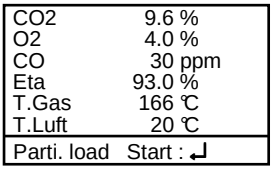
Storage of the measurement values (after getting stable) is done with the key **<store>**.



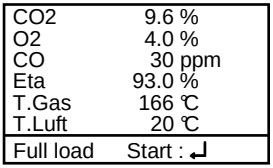

By using the curser **<down>** it can scrolled to the next measurement **"Temp free"**. Here is the option for another temperature measurement.



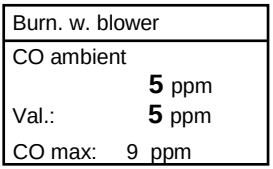

After storing the temperatures the measurement of the combustion gases are next. By pressing the curser **<down>** a 1-minute calibration cycle starts for flashing the sensors with fresh air. During calibration cycle the probe must not be positioned in the combustion tube. After calibration cycle, the combustion measurement at part capacity can be started. For measurement the probe must be positioned in the combustion tube. Measurement will be stated by pressing **<Enter>**. After 90 seconds the measured values will be automatically stored for later printout.



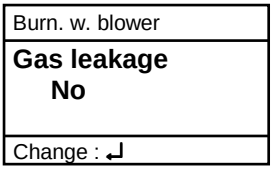

Next point of the routine is the combustion measurement at full capacity by pressing **<Enter>**. Also here the values will be measured after 90 seconds.




After finishing the combustion measurement the CO-value of the surrounding air can be determined. Use the probe to check the area around the boiler. Besides the stored value (press **<store>**) the instrument stores the maximum CO-value of the measurement.



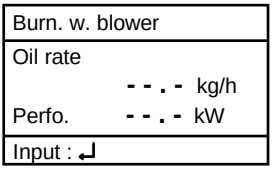
At the end of the measurement routine (curser **<down>**) it is checked whether a gas leakage at the unit could be determined. Confirmation could be done by using the key **<Enter>** (yes / no).



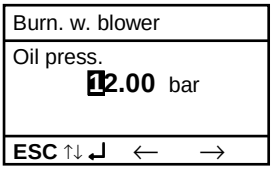

The printout (IR printer required) of all results of the measurement routine could be done by pressing **<Print>**.

## 6.2.2. Oil fan burner

Using Heating oil (B) as fuel type the routine starts by determining the oil flow and the thermal capacity brought to the boiler. Open the menu **<Oil pressure>** by pressing **<Enter>**. Enter the measured oil pressure as follows:

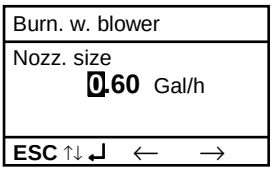



1. Use the keys **<store>** (left) and **<Print>** (right) to come to the positions which should be changed (corresponding field is flashing).



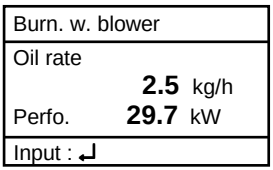

2. Set the number by using the curser keys.

After setting and pressing **<Enter>** the submenu nozzle size will be opened. Enter the used nozzle size like described above.




After setting and pressing **<Enter>** the result of the calculation will be displayed. The calculation can be repeated if needed. For calculation following heating values are taken:

Heating oil (B) = 11,86 kWh/m3



At the next point of the routine (curser **<down>**) there is the option of determination of a temperature difference (W. Temp. warm – W. Temp. cold). For determination of the two temperatures the T-Room probe is used (waterproof version).

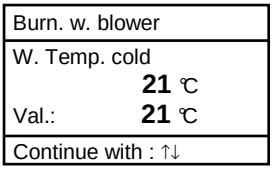
Storage of the measurement values (after getting stable) is done by the key **<store>**.

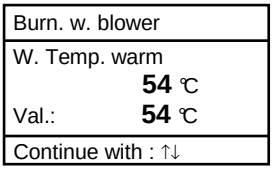
By using the curser **<down>** it can be scrolled to the next measurement **"Temp free"**. Here is the option for another temperature measurement.

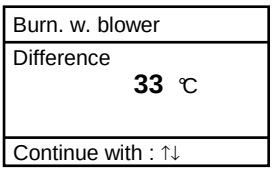
After storing the temperatures, the measurement of the combustion gases are next. By pressing the curser **<down>** a 1-minute calibration cycle starts for flashing the sensors with fresh air. During calibration cycle the probe must not be positioned in the combustion tube. After calibration cycle, the combustion measurement at part capacity can be started. For measurement the probe must be positioned in the combustion tube. Measurement will be started by pressing **<Enter>**. After 90 seconds the measured values will be automatically stored for later printout.

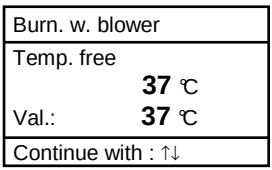
Next point of the routine is the combustion measurement at full capacity by pressing **<Enter>**. Also here the values will be measured after 90 seconds.

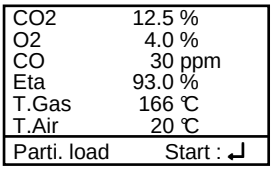
The printout (IR printer required) of all results of the measurement routine could be done by pressing **<Print>**.

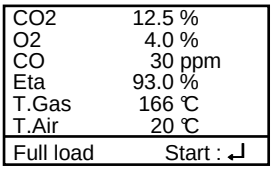


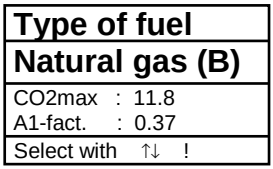



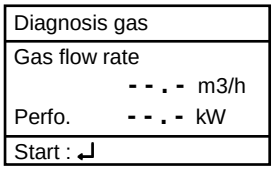
## 6.3. Diagnosis gas

Select from the main menu the sub menu **"Diagnosis Gas"** and press **<Enter>**. The table of fuel types will be displayed. Following fuel types can be selected:

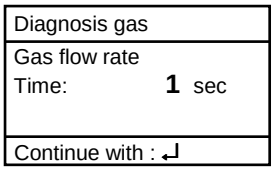



Natural gas (B)
Town gas (B)
Coke gas (B)
Liquid gas (B)

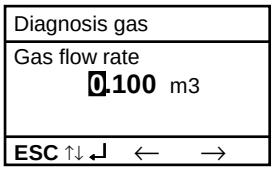
Select with the arrow keys the corresponding fuel type and confirm by pressing **<Enter>**.




First the thermal capacity brought to the boiler can be determined with the ecom-B. For this the gas meter has to be observed. By pressing **<Enter>** a stopwatch can be started and stopped. The amount of gas consumed in the meantime is necessary for calculation and is entered as follows:

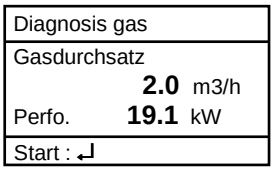



1. Select the position which should be changed with the keys **<store>** (left) and **<Print>** (right) (corresponding field flashes)




2. Set the value by using the cursers **<up / down>**.

After setting and confirmation by pressing **<Enter>** the result of the calculation will be displayed and stored. Calculation can be repeated if needed. For calculation following heating values are taken:




Natural gas (B) = 9,53 kWh/m3
Town gas (B) = 5,00 kWh/m3
Coke gas (B) = 4,83 kWh/m3
Liquid gas (B) = 25,90 kWh/m3

After determination of the burning capacity the next point of the routine is the CO-measurement. By pressing the curser **<down>** a 1-minute calibration cycle starts for flashing the sensors with fresh air. During calibration cycle the probe must not be positioned in the combustion tube. After calibration cycle the CO-content of the surrounding air can be determined. Use the probe to check the area around the boiler. Beside the stored value (press key **<store>**) the instrument stores maximum CO-value of the measurement.

| Diagnosis gas | |
|---|---|
| CO ambient | |
| | **0** ppm |
| Val.: | **- - -** ppm |
| CO max: | 0 ppm |

Next point of the routine (curser key **<down>**) the CO-value in the combustion tube of the boiler is determined. For measurement the probe must be positioned in the combustion tube. Apart from the stored value the maximum CO-value of the measurement is stored.

| Diagnosis gas | |
|---|---|
| CO flue gas | |
| | **0** ppm |
| Val.: | **- - -** ppm |
| CO max: | 26 ppm |

After storing the CO-values the next point are the draught measurements (curser key <down>). For exact measuring it's recommended to reset the sensor to zero. Remove the draught hose off the instrument and press <CAL>. The zero point of the sensor is set now. After the draught has stabilised it can be stored for later printout by pressing the key **<store>**.

| Diagnosis gas | |
|---|---|
| Draft | |
| | **-0.12** hPa |
| Val.: | **- . - -** hPa |
| Set zero point **CAL.** | |

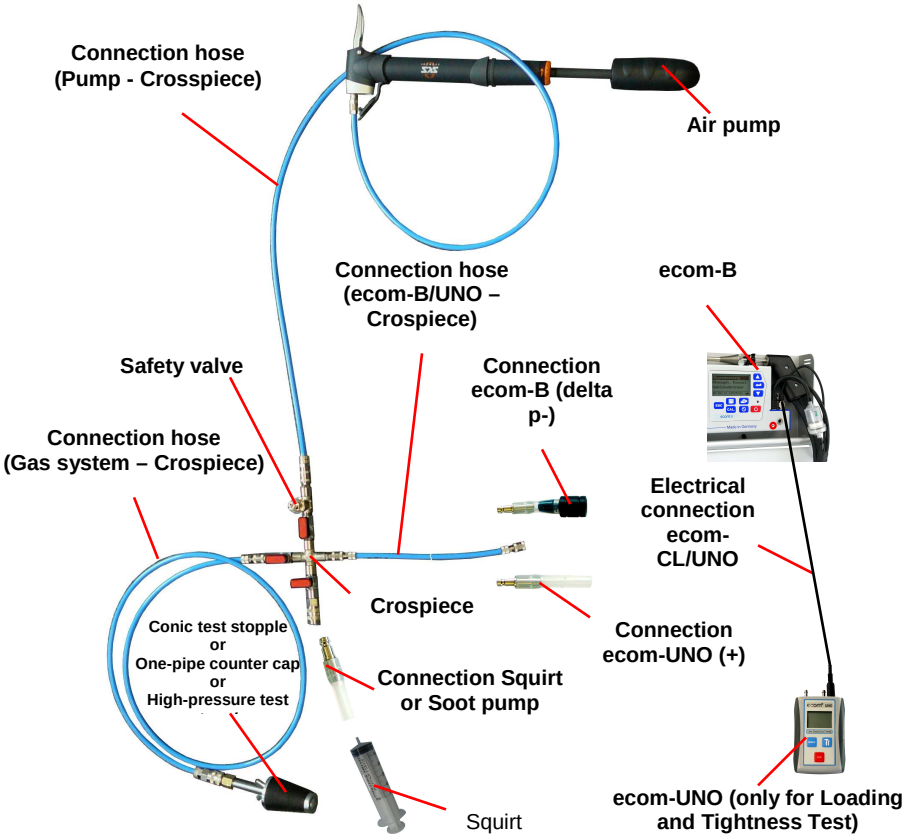
At the end of the measurement routine (curser down) it is checked whether a gas leakage at the unit could be determined. Confirmation could be done by using the key **<Enter>** (yes / no).

| Diagnosis gas |
|---|
| **Gas leakage** |
| **No** |
| Change : ↵ |

The printout (IR printer required) of all results of the measurement routine could be done by pressing **<Print>**.

## 7. Pressure Tests (option)

1. Use only air or inert gas for check !
2. Respect the „Technical Rules for Gas installations“!



Call up the menu **„Pressure Tests“** with the pre-programmed measurement routines **„Pressure Test“**, **„Loading Test“**, **„Tightness Test“** and **„Usage property“**. Parameters to each measurement routine can be adjusted in the menu **„Setup“**.

## Setup

Scroll with cursor keys **<Up/Down>** until the menu **“Setup”**. Press **<Enter>** to activate the menu. The following parameters can be adjusted for the corresponding measurement routine:

**Pressure Test**
- Stabilization time (1 - 10 min, default: 1 min)
- Measurement time (10 - 120 min, default: 5 min)

**Loading Test**
- Stabilization time (1 - 10 min, default: 1 min)
- Measurement time (10 - 120 min, default: 10 min)
- Test pressure (900 - 1200 hPa, default: 1000 hPa)

**Tightness Test**
- Stabilization time (1 - 10 min, default: 1 min)
- Measurement time (10 - 120 min, default: 10 min)
- Test pressure (90 - 160 hPa, default: 150 hPa)

**Usage property**
- Stabilization time (1 - 270 min, default: 1 min)
- Measurement time (10 - 240 min, default: 10 min)
- Test pressure (20 - 160 hPa, default: 50 hPa)
- Max. operation pressure (10 - 100 hPa, default: 23 hPa)

Each parameter can be adjusted the same way:

1. Select the parameter with cursor keys **<Up/Down>**.

2. Press **<Enter>** to activate.

3. select the digit with the keys **<Store>** (left), **<Print>** (right) and adjust with the cursor keys **<up/down>**.

4. Confirm with **<Enter>.**

## Pressure Test

The **“Pressure Test”** up to 100 hPa is deposited as a measurement routine in the ecom-B. Proceed as follows:

1. Close the conduit with a suitable adapter (test stopple, high-pressure stopple or one-pipe counter cap).

2. Connect the components as described before.

3. Scroll with cursor keys **<Up/Down>** to the menu **“Pressure Test”**. Activate with **<Enter>**.

4. Create the pre-adjusted test pressure (max. 100 hPa) with the air pump.

5. Interrupt the connection to the air pump (switch-off the ball valve) and start **“Pressure Test”** with **<Enter>**.

6. Wait for stabilization time (the measurement will start automatically).

7. Once the measurement time is over, the result is displayed and can be printed (IR printer required) by pressing **<Print>**.

8. If the menu **“Pressure Test”** is selected again, so the result can be called up with **“No” / <Enter>** (as long as the ecom-B is on) or a new measurement can be started with **“Yes” / <Enter>** (switching from **“No“** to **“Yes“** with cursor keys **<Up/Down>**).

## Loading Test

The **"Loading Test"** acc. to DVGW – TRGI Process Instructions G 600 at pipes (operation pressure up to 100 hPa) is deposited as a measurement routine in the ecom-B. Proceed as follows:

1. Connect the ecom-UNO to the connection AUX of the ecom-B.

2. Close the conduit with a suitable adapter (test stopple, high-pressure stopple or one-pipe counter cap).

3. Connect the components as described before.

4. Scroll with cursor keys **<Up/Down>** to the menu **„Loading Test"**. Activate with **<Enter>**.

5. Create the pre-adjusted test pressure with the air pump (the unit beeps as soon as the pressure level is achieved).

6. Interrupt the connection to the air pump (switch-off the ball valve).

7. Wait for stabilization time (if the pressure remains in the range **"test pressure +/- 10%"** during stabilization time, so the measurement will start).

8. Once the measurement time is over, the result is displayed and can be printed (IR printer required) by pressing **<Print>**.

9. If the menu **"Loading Test"** is selected again, so the result can be called up with **"No" / <Enter>** (as long as the ecom-B is on) or a new measurement can be started with **"Yes" / <Enter>** (switching from **"No"** to **"Yes"** with cursor keys **<Up/Down>**).

## Tightness Test

The **"Tightness Test"** acc. to DVGW – TRGI Process Instructions G 600 at pipes (operation pressure up to 100 hPa) is deposited as a measurement routine in the ecom-B. Proceed as follows:

1. Connect the ecom-UNO to the connection AUX of the ecom-B.

2. Close the conduit with a suitable adapter (test stopple, high-pressure stopple or one-pipe counter cap).

3. Connect the components as described before.

4. Scroll with cursor keys **<Up/Down>** to the menu **„Tightness Test"**. Activate with **<Enter>**.

5. Create the pre-adjusted test pressure with the air pump (the unit beeps as soon as the pressure level is achieved).

6. Interrupt the connection to the air pump (switch-off the ball valve).

7. Wait for stabilization time (if the pressure remains in the range **"test pressure +/- 10%"** during stabilization time, so the measurement will start).

8. Once the measurement time is over, the result is displayed and can be printed (IR printer required) by pressing **<Print>**.

9. If the menu **"Tightness Test"** is selected again, so the result can be called up with **"No" / <Enter>** (as long as the ecom-B is on) or a new measurement can be started with **"Yes" / <Enter>** (switching from **"No"** to **"Yes"** with cursor keys **<Up/Down>**).

## Usage property

The **"Usage property"** acc. to DVGW – TRGI Process form G 624 at conduits is memorised as a measurement routine by the ecom-B. The calculation of the leak rate happens automatically according to the following equation and corresponds herewith to the procedure of the DVGW-TRGI Process Form G 624:

**VB = V/TM * ((PA + P1)/(PA + P2)-1) * PB/P1 * f**

with:
**VB** = Gas leak volume in operation state (l/h)
**V** = Pipe content in litres
**TM** = Measurement duration in hours
**PA** = Barometer stand in hPa
**P1** = Test pressure at meas. beginning in hPa
**P2** = Test pressure at measurement end in hPa
**PB** = Maximal gas operation pressure in hPa
**f** = Factor for consideration of gas type

Proceed as follows:

1. Close the conduit with a suitable adapter (test stopple, high-pressure stopple or one-pipe counter cap).

2. Connect the components as described before.

3. Scroll with cursor keys **<Up/Down>** to the menu **„Usage property"**. Activate with **<Enter>**.

4. Adjust the air pressure **(PA)** with cursor keys **<Up/Down>** and confirm with **<Enter>**.

5. Choose the gas type **(f)** with cursor keys **<Up/Down>** and confirm with **<Enter>**. The following gas types are recorded with their respective factors:

**Natural Gas, Air, Town Gas, Propane, Butane, Hydrogen**

6. Adjust the maximal operation pressure **(PB)** with cursor keys **<Up/Down>** and confirm with **<Enter>**.

7. The pipe volume **(V)** is needed for the calculation of the leak rate. The ecom-B offers two possibilities:

a. Type in pipe volume **(V)**:
- Choose **"No"** at the inquiry **"Calculate Volume automatically ?"** (switching from **"No"** to **"Yes"** with cursor keys **<Up/Down>**).
- Adjust pipe volume **(V)** with cursor keys **<Up/Down>** and confirm with **<Enter>**.

b. Calculate pipe volume automatically **(V)**:
- Choose **YES** at the inquiry „Calculate Volume automatically ?".
- Connect the squirt or soot pump as described before.
- Open ball valve and wait until the pressure is stabilized.
- Choose squirt or soot pump with the key **<CAL.>**.
- Start volume calculation with **<Enter>**.
- Infer the test volume with squirt or soot pump. The decrease of pressure must be min. 2 hPa (otherwise operate squirt or soot pump several times).
- Close ball valve and confirm with **<Enter>**.
- Choose number of strokes with cursor keys **<Up/Down>** and confirm with **<Enter>**.

8. Create the pre-adjusted test pressure with the air pump (the unit beeps as soon as the pressure level is achieved).

9. Interrupt the connection to the air pump (switch-off the ball valve).

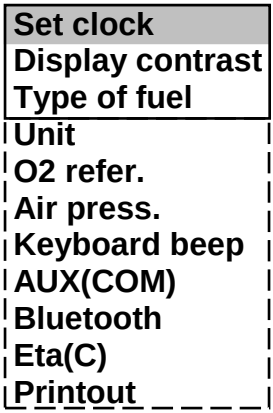
10. Wait for stabilization time (if the pressure remains in the range **"test pressure +/- 10%"** during stabilization time, so the measurement will start).

11. Once the measurement time is over, the result is displayed and can be printed (IR printer required) by pressing **<Print>**.

12. If the menu **"Usage property"** is selected again, so the result can be called up with **"No" / <Enter>** (as long as the ecom-B is on) or a new measurement can be started with **"Yes" / <Enter>** (switching from **"No"** to **"Yes"** with cursor keys **<Up/Down>**).

## 8. Adjustments

In addition to the already described features of the **ecom-B**, various settings could be made at the instrument. Select from the main menu the sub-menu **<Adjustment>** and confirm with **<Enter>**. A list of the possible settings is displayed and can be changed according to usage. Scroll the curser to the corresponding line and press **<Enter>**:




**Set clock**
(setting can be made by pressing **<Enter>**):
-scroll with cursers **(up / down)** to the value which should be changed
-activate the setting by pressing **<Enter>**
-set the time by using curser keys **<up / down>**
-confirm the setting by pressing **<Enter>**
-after finishing leave the menu with **<ESC>**

**Display contrast** (activate with **<Enter>**)
-set display contrast with curser **(up / down)**
-reset with **<CAL>**

**Type of fuel** (select after pressing **<Enter>**)
-change the fuel type
**Unit** (change with cursers **(up / down)**
-calculation of gas concentration in:

-ppm = volume concentration (parts per million)
-mg/m3 = mass concentration unit
-mg/kWh 0,0 % = Mass concentration per capacity unit calculated with reference $O_2$
-ppm 0,0 % = volume concentration (parts per million) calculated with reference $O_2$
-mg/m3 0,0 % = mass concentration per capacity unit calculated with reference $O_2$

-calculated with reference $O_2$ – formula for the calculation:

$$E_{ref} = E_{meas} * \frac{21 - O_{2ref}}{21 - O_{2meas}}$$

**$O_2$ Reference** (set by pressing **<Enter>**):
-setting of reference oxygen value $O_{2ref}$
-reset by pressing **<CAL>**

**Air pressure** (set by pressing **<Enter>**):
-Input of barometric pressure for calculation of dew point
-Reset by pressing **<CAL>**

**Keyboard beep** (set with cursers **<up / down>**)
-set signal when hitting the keys
-reset by pressing **<CAL>**

**Baud rate** (adjustment via **<CAL.>**):
-Adjustment of transfer speed by data transfer via RS 232
(1200 -38400 Baud)
**Online data** (adjustment via **cursor keys**):
-Adjustment what kind of Data should be sent:
- -No protocol: Data for program „miniDV“
- -Remote: only for special applications
- -DAS (rbr): Data for program „DASNT“ (**1200 Baud**)

The programs „miniDV“ und „DASNT“ are available free of charge from the rbr website.

**Bluetooth** (**Option** / selection after pressing **<Enter>**):
-Adjustment what kind of Data should be sent:
- No protocol: Data for program „miniDV“
-Remote: only for special applications
-DAS (rbr): Data for program „DASNT“ (**1200 Baud**)

The programs „miniDV“ und „DASNT“ are available free of charge from the rbr website.

**With first use of the Bluetooth connection to PC type in password „0000“ or „1234 “!**

**Eta(C)** (adjustment via **cursor keys**):
- Efficiency calculation with or without condensation gain

**Printout** (set by pressing **<Enter>**)
-create a protocol feet (8 x 24 digits)
-put in the text for line one as follows:
1. activate symbol selection with **<Standby>**
2. select keyboard with **<CAL.>** (5 keyboards are available)
3. choose a symbol with **<store>** (left), **<Print>** (right) and cursers **<up / down>**
4. take the symbol with **<Enter>**
5. repeat (2. - 4.) until line 1 is finished
6. deactivate choosing symbols with **<Standby>** and change with curser **<up>** to line 2.
7. after finishing the input for all lines leave the menu with **<ESC>**

## 9. Control

The electrochemical sensors used for gas analysis are submitted to a wearing process and age. Along the operation period, they alter their output values depending on the gas concentration, flow duration and soiling degree of the measured gases. The programme controls the sensors and corrects drifts. If drifts and the correlated measurements errors increase, an error message is displayed. In this case the corresponding sensors must be changed by one of our authorised service centres. The actual status of the sensors is displayed in the control menu. Additionally on two more pages will be displayed (change the display pages by using the cursers):

-the battery voltage (charging status) displayed in all menus as symbol:

Battery full Battery ½ full Battery empty

| | |
|---|---|
| O2 | 1034 mV |
| CO | -10 mV |
| Batt | 6.42 Volt |
| Tel.No. 02371/945-5 | |
| Ins.No. CL-0009 | V1.1 |
| Further info with ↑↓ | |

-the phone number of next service centre
-the serial number
-the software version
-the operation hours
-the date of last service
-the number of CO switch offs
-the number of error occurred

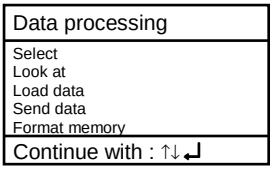
| | |
|---|---|
| Oper. hours | 7.39 |
| Service date | 23.06.04 |
| CO-Überläufe | 0 |
| Error counter | 00 |
| Tel.No. 02371/945-5 | |
| Ins.No. CL-0009 | V1.1 |
| Further info with ↑↓ | |

-Collection of the last maintenance

| Last service | |
|---|---|
| 26.06.12 | 103 hrs |
| 10.06.11 | 073 hrs |
| 31.05.10 | 035 hrs |
| -- . -- . -- | |
| -- . -- . -- | |
| Further info with ↑↓ | |

# 10. Data processing

The menu **„Data processing“** allows the selection of the following functions:




**Select:**
This sub-menu enables to search for or create a data record for the allocation of measurement values (see chapter 4.).

**Look at:**
The recorded values of the selected data record can be viewed (see chapter 4.).

**Load data:**
Possibility of data import e.g. from rbr software (available at „www.rbr.de“ - check the transfer options of your software).
Proceed as follows:

1. Connect instrument and PC with a current RS232 cable.
2. Select **“Load data“** and confim with **<OK>**.
3. Answer following question with **Yes** (selest with cursor keys).
4. Start the data transfer at the PC.

**Send data:**
The date record completed with values can be transfered to the PC programme using this function (procedure identical to **„Load data“**).

**Format:**
This function is normally only needed by the initial adjustment of the instrument by the manufacturer (preparation of internal memory to data receipt). **Caution: All recorded values will get lost!**

## 11. Maintenance Tips

To secure the accuracy of your measuring instrument we recommend the annual check by an authorized ecom partner. In the case of strong demand (e.g. permanent several hours of measurement per day, rough conditions etc.) shorter intervals between checks should be selected - please contact your ecom partner. All ecom partners are listed under www.rbr.de. Do not use other sensor than supposed by our factory and be aware that service done by service stations not authorised by rbr will lead to expiration of any warranty.

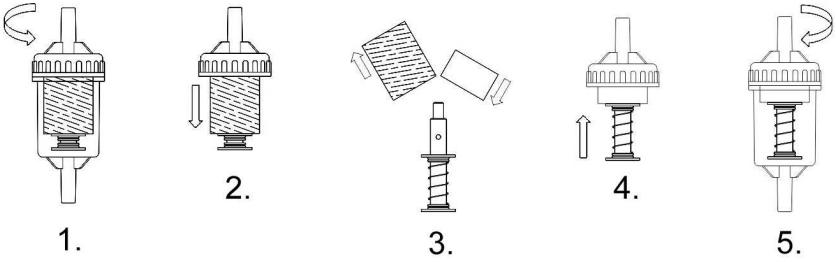
The following tips for the daily care of accessible parts and components should be helpful:

**Condensate pad**

Condensate pad

Regularly check the condition of the condensate pad. It should be changed:
- If it is soiled darker than no. 3 on the soot scale
- If its extension is on mark "MAX"

Replace the condensate pad as follows:
1. Remove hose from the cap and unscrew the cap
2. Unscrew the retaining bolt with spring
3. Replace old condensate pad against new
4. Scew on retain bolt with spring again
5. Scew on cap and replace the hose to the cap



**Sensors**
Each time the instrument is switched on the sensors are calibrated with fresh air. The instrument permanently monitors the condition of the sensors. New sensors wear out from use in time due to reaction (O2-sensor) and due to soiled gases respectively gases in concentrations beyond the nominal range (toxic sensors). The output values of the sensors are (see menu **"Control"**):

| | |
|---|---|
| O2 | approx. 1500 mV |
| CO | 0 mV (+/- 30) |

If an error message is displayed during calibration cycle and does not disappear after repeated calibrations the instrument must be send to a service centre. The O2 sensor should show > 200 mV, otherwise it should be changed.
The CO-sensor is protected by the internal program for overload. In case the limit of 4000 ppm is exceeded the gas pump is switched off.

**Power supply**
The battery ensures a main power intependent operation. The battery is automatically charged when the instrument is connected to the main power supply. (Please do not interrupt the charging shortly since the charging circuitry could operate faulty.) The recharge of the battery should be done in any case if the voltage display (menu **"Control"**) is less than 5.8 V (Instrument will stop working at 5.5 V).

**Sampling probe and hose**
Depending on the frequency of use the probe and the hose must be cleaned regularly, thus in order to prevent particles from lodging and early ware due to corrosion.
The hose can be cleaned after all connections on the instrument and the probe itself have been switched off (use warm water and then blow out to dry)

## 12. Technical Data

| Paramenter | Range | Measurement principles |
|---|---|---|
| O2 | 0 ... 21 vol-% | electrochemical |
| CO | 0 ...4000 ppm | electrochemical |
| NO (Option) | 0 ...5000 ppm | electrochemical |
| CO2 | 0 ...CO2 max. | calculated |
| T-G | 0 ... 500 ℃ | NiCr/Ni |
| T-R | 0 ... 100 ℃ | semiconducter |
| Pressure | 0 ... +/- 100 hPa | DMS-bridge |
| Efficiency | 0 ... 120 % | calculated |
| Losses | 0 ... 99,9 % | calculated |
| Lambda | 1 ... ∞ | calculated |
| CO-undiluted (reference-O2; adjustable) | | calculated |
| Dew point of combustion gases | | calculated |

| | |
|---|---|
| **Power Supply** | 110 - 230 V~ / 50 - 60 Hz; |
| **Battery** | 6 V / 3,3 Ah |
| **Display:** | graphic display, backlit |
| **Size** | (W x H x D) 250 mm x 180 mm x 80 mm |
| **Weight** | approx. 2,1 kg (complete with sampling system) |

Subject to technical changes
V1.0/ 09.2012

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# 13. FAQ

| | |
|---|---|
| Where do I find important instrument information? | In the menu „Control“ all important instrument informations are shown (e.g. accu voltage, sensor values, unit number, next service date, operation hours etc.). With the arrow keys stands you can switch to the second page. |
| How long is the life span of the sensors? | The life span depends on the operating hours and the instrument equipment. The life span of the toxic sensors (CO, NO, $SO_2$, $NO_2$) is affected by high gas concentrations and a not sufficient purging. The life span for these sensors amounts to on the average between 4 and 6 years. The life span of the $O_2$ sensor is independent of the operating hours and amounts to approx. 2 years. |
| Which sensors can I exchange? | Please contact the next authorised service centre for changing sensors. |
| The instrument shows the error message „$O_2$ sensor 0 mV“! | The sensor must be renewed. |
| The instrument shows the message „Check required“! | This message appears automatically every 12 months or after 250 operating hours. Note: This is a recommendation to let check the instrument. The instrument is however still ready for use. |
| The instrument shows the error message „T-Gas“ oder „T-Air“! | Possible reasons could be:<br>- Cable is broken (at the plug)<br>- T-Air sensor is broken<br>- Thermocouple is broken<br>- Cable is defective<br>Note: The error messages can be ignored at the CL by pressing „Enter“. Calculations that depends on these temperatures are not implemented. |
| The instrument shows wrong or inaccurately $CO_2$ values! | Possible reasons could be:<br>- $O_2$ is defective ($CO_2$ values are calculated from the $O_2$ values)<br>- Pump is not working correctly<br>- Leakage in the gas way<br>- condensate trap / gas cooler is clogged |

| | |
|---|---|
| My instrument cannot be switched on! | - Please check the mains cable<br>- Please check the fuse<br>- Please check mains connection (Plug socket switched on?)<br>- Please load the accumulator min. 8 hours (Accumulator could be over-discharged) |
| My instrument does not print! | Please check whether the printer paper is correctly inserted. The thermal printer writes only on the thermally sensitive side. Please use always the correct paper for the printer, you will prevent defects at the printer. Please make sure that the printer is clean (no chads in the drive). |
| Can I change the printout? | You can change the printout (Menu: “Adjustments”). |

Hint: If you have several instruments of the same type, you can locate an error by exchanging the accessories (probe, hose, temperature sensor etc.).

If further questions or problems should arise, please contact the next authorised service centre.